SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 15.—"Note on the Present State of the Theory of Thin Elastic Shells." By A. E. H. Love, M.A., St. John's College, Cambridge. Communicated by Lord Rayleigh, Sec. R.S.

This is a note in correction of the author's paper in Phil. Trans., A., 1888. In that paper it was shown that, when no surface tractions are applied to the surfaces of the shell, the potential energy per unit area can be expressed in the form $Ah^3W_1 + BhW_2$, where $2h$ is the thickness of the shell, and A and B are elastic constants. The function W_2 depends on quantities expressing the extension of the middle surface, and W_1 depends on quantities defining the changes of curvature; and it was shown that it is impossible to satisfy the boundary conditions which hold at a free edge, except by taking account of the term in W_2. A theory of the vibrations of bells was therefore proposed in which the term in W_2 was retained, and the term in W_1 rejected, *i.e.* the vibrations were supposed to depend mainly on the extension of the middle surface. This theory was in opposition to Lord Rayleigh's theory in Proc. Lond. Math. Soc., 1882, which was founded on the supposition that the middle surface remains unstretched. In December 1888 Lord Rayleigh proved from general principles that the mode of deformation corresponding to the gravest tone cannot be included among the extensional modes; but it has not yet been shown how, in any particular case, the boundary conditions can be satisfied by a mode of oscillation depending mainly on bending. The solution of the difficulty has, however, been recently pointed out by Mr. Basset and Prof. Lamb. Each of these writers has proved that, in particular statical problems relating to cylinders, the quantities expressing the extension can be very small everywhere except in the neighbourhood of an edge, and *there* they may increase with such rapidity as to secure the satisfaction of the boundary conditions, the total potential energy due to extension, which varies as the surface integral of hW_2 over the middle surface, being, nevertheless, negligible in comparison with that due to bending, which varies as the surface integral of h^3W_1. There is little doubt that, as Mr. Basset and Prof. Lamb suggest, all this will hold equally in the case of a vibrating shell under ordinary conditions. Some detailed corrections of the author's previous paper were given

Zoological Society, January 6.—Prof. Alfred Newton, F.R.S., Vice-President, in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of December 1890.—Mr. Sclater exhibited some sketches made by Lieut. W. E. Stairs, R.E., of the horns of a large antelope, apparently new to science, which had been met with by the Emin Pasha Relief Expedition in the forest-district of the Aruwimi River.—Mr. G. A. Boulenger read the description of a new lizard of the genus *Ctenoblepharis* obtained in the Province of Tarapacà, Chili, by Mr. A. A. Lane, which he proposed to describe as *Ctenoblepharis jamesi*.—A second paper by Mr. Boulenger contained an account of some specimens of extinct and fossil Chelonians preserved in the Museum of the Royal College of Surgeons.—Mr. F. E. Beddard gave an account of certain portions of the anatomy of the Kagu (*Rhinochetus jubatus*) as observed in specimens lately living in the Society's Gardens.—Lieut.-Col. H. H. Godwin-Austen, F.R.S., read a paper on the land-shells collected in Borneo by Mr. A. Everett, Mr. Whitehead, and others. In this communication (the second of the series) the author gave a list of the species of the families Zonitidæ and Helicidæ as known from Borneo up to the present time. He described the anatomy of several species and defined two new genera (*Diukia* and *Everettia*), pointing out how they differ from previously known genera founded on anatomical characters.

Geological Society, January 7.—A. Geikie, F.R.S., President, in the chair.—The following communications were read:—On the north-west region of Charnwood Forest. with other notes, by the Rev. E. Hill and Prof. T. G. Bonney, F.R.S. The paper contains the results of a re-examination of the north-west region, when the authors had the advantage of using the six inch Ordnance-map, published since the completion of their former work. In this they had expressed the opinion that the rock of Peldar Tor and that of High Sharpley were somewhat altered pyroclastics, being much influenced by the non-igneous origin asserted for the "porphyroids" of the Ardennes. But in 1882 one of them had visited this region, and was then convinced that the porphyroids, which closely resembled the rock of Sharpley, were felstones which had been rendered schistose by subsequent pressure. The result of their subsequent work in Charnwood has convinced the authors that the rocks of Sharpley and of Peldar Tor are in the main of a like origin and history. The mass of Bardon Hill, where the quarries have been much enlarged, has also been studied, and some details in the section formerly published have been corrected. The schistose bands, on which the authors relied as marking horizons for stratigraphical purposes, prove to be zones of exceptional crush. The occurrence of a rock exactly resembling that of Peldar Tor is fully established. It is extremely difficult to decide upon the true nature of the rocks which are chiefly worked in the pit, but the authors remain of opinion that for most of them a pyroclastic origin is the more probable. Some notes are added upon the relations of the holocrystalline igneous and the sedimentary rocks of the Forest, upon the Blackbrook group, and upon the fragments and pebbles in certain of the coarser ashy deposits. Some remarks are made upon the glacial phenomena exhibited in the Forest region; these indicate that this cannot have been overridden by a great northern ice-sheet, and it does not afford the usual signs of the action of local glaciers. At the same time it has been a centre of dispersion for erratics, especially towards the south and south-west, these being found sometimes more than twenty miles away. Hence, in the opinion of the authors, the erratics have been distributed by floating ice during an epoch of general submergence. Some minor "corrigenda" in the earlier papers are noted, with certain changes in the names of localities, bringing them into harmony with the six-inch map.—Note on a contact-structure in the syenite of Bradgate Park, by Prof. T. G. Bonney. The author described a specimen, obtained at Bradgate Park, showing a junction of the syenite and slaty rock of Charnwood. The latter rock is very slightly altered; the former exhibits a number of grains of felspar and quartz set in a matrix which has now a "trachytic," now a devitrified structure. He traced the former into the "micrographic" structure observed generally in these syenites, and discussed its significance. His study of these structures in this and many other instances led him to infer that they generally indicated that the rock, at a late stage, had consisted of a mixture of previously formed crystalline grains and a viscous magma, that the temperature of the mass had been comparatively low, that it had cooled rather gradually, and that the condition of the magma—*i.e.* one of very imperfect fluidity—had not permitted of free molecular movements among its constituents. Thus this structure, together with certain others mentioned, might be regarded as indicative of "crystallization under constraint." The reading of these two papers was followed by a discussion, in which Prof. Blake, Dr. Callaway, Mr. Gregory, General MacMahon, the President, and Prof. Bonney took part.—On the unconformities between the rock-systems underlying the Cambrian quartzite in Shropshire, by Dr. C. Callaway. In the course of a discussion on this paper, some remarks were made by Prof. Blake, Prof. Bonney, Dr. Hicks, and the author.

Anthropological Institute, January 13.—Mr. E. W. Brabrook, Vice-President, in the chair.—Mr. Lewis exhibited a specimen of the stone used by Admiral Tremlett to cut marks on the granite of which the Breton dolmens are composed.—Mr. R. B. Martin exhibited a fire-syringe from Borneo.—Mr. C. H. Read exhibited some specimens of worked jade from British Columbia, and a bored stone from San Juan, Teotihuacan.—Mr. J. Edge Partington and Mr. C. Heape exhibited an ethnographical album of the Pacific Islands.—Mr. F. W. Rudler read a paper on the source of the jade used for ancient implements in Europe and America. Its object was to call the attention of anthropologists to certain mineralogical discoveries which have been made within the last few years, and which tend to overthrow the well-known theory which suggested early intercourse with the East as the source of the jade objects found in the lake-dwellings of Switzerland, the prehistoric burial-places of France and Germany, and the ancient Indian graves on the north-western coast of America. Herr Traube, of Breslau, first recorded the occurrence of jade *in situ* at Jordansmühl, in Silesia, and afterwards discovered it at the arsenical-pyrites workings at Reichenstein. Rough pebbles have also been found in the valleys of the Sann and the Mur, in Styria. Dr. G. M. Dawson has described the occurrence of boulders of jade, partly sawn through, at Lytton and Yale, on the Fraser River; and Lieutenant Stoney has actually found the mineral *in situ* at the Jade Mountains, north of the Kowak River, in Alaska. These discoveries prove that, contrary to general belief, jade does occur in the rocks of Europe and of North America, thus supporting the view so long held by Dr. A. B. Meyer, of the Royal Zoological Museum in Dresden, and accepted in America not only by Dr. Dawson, but by Prof. F. W. Clarke and Mr. Merrill, Mr. Kunz, and others. In England, most anthropologists have hitherto inclined to the exotic rather than to the indigenous origin of the prehistoric jades.

Linnean Society, January 15.—Prof. Stewart, President, in the chair.—The President exhibited a bunch of holly berries which were remarkable for being perfectly black instead of red, but which in no other respect looked abnormal. The peculiarity was attributed to the effect of a fungus.—Mr. J. E. Harting exhibited a male specimen of the wigeon (*Anas penelope*) which had been shot in Ireland, and which had a tassel of feathers about an inch in length depending from the under side of the neck. The explanation suggested was that it was the result of a former shot wound, when the pellet, as often happens, plugged the wound with feathers, and the skin had grown round and below the obstruction.—A paper was then read by Dr. P. H. Carpenter, on certain points in the morphology of the *Cystideæ*, which were admirably demonstrated with the aid of diagrams. A discussion followed, in which Mr. H. Bury and Mr. Bather took part.—On behalf of Mr. Thomas Kirk, of Wellington, New Zealand, the Secretary read an interesting report of a botanical visit to the Auckland Islands.

Royal Meteorological Society, Jan. 21.—Annual Meeting.—Mr. W. H. Dines, Vice-President, in the chair.—Dr. Tripe read the Report of the Council, which stated that the progress of the Society during the past year had been of a satisfactory character. Among the investigations carried on by the Society are the following: the organization of a large number of meteorological stations, the observations from which are examined and reduced by the staff, and printed in the *Meteorological Record*; the regular inspection of these stations by the assistant secretary; the collection and discussion of phenological observations; and an inquiry into the thunderstorms of 1888 and 1889. An exhibition of instruments is held annually in March. During the year a complete catalogue of the library, extending to 222 pages, has been compiled and published. The library has so much overgrown the present limited accommodation, that the Council have been obliged to consider the question of obtaining more commodious rooms, and have consequently inaugurated a "New Premises Fund," which is being well supported by the Fellows.—After the adoption of the Report, the Officers and Council for the ensuing year were elected.——At the ordinary meeting the following papers were read:—Note on a peculiar development of cirrus cloud observed in Southern Switzerland, by Mr. R. H. Scott, F.R.S.—Some remarks on dew, by Colonel W. F. Badgley. These are notes on observations which were made to discover whether all dew is deposited from the air, or if some also comes from the earth and plants, and also what quantity is formed during the year. The conclusions which the author deduces from his observations are: (1) that the earth always exhales water vapour by night, and probably a greater quantity by day; (2) that the quantity of water vapour given off by the earth is always considerable, and that any variation in the quantity is mainly due to the season of the year; (3) that the greater part of the dew comes from the earth vapour; and (4) that plants exhale water vapour, and do not exude moisture. The total quantity of dew collected on the author's grass plates in the year was 1·6147 ins.

Entomological Society, January 21.—Fifty-eighth Annual Meeting.—Lord Walsingham, F.R.S., President, in the chair.—An abstract of the Treasurer's accounts having been read by Mr. H. Druce, one of the auditors, the Secretary, Mr. H. Goss, read the Report of the Council.—It was then announced that the following gentlemen had been elected as officers and Council for 1891:—President, Mr. Frederick DuCane Godman, F.R.S.; Treasurer, Mr. Robert McLachlan, F.R.S.; Secretaries, Mr. Herbert Goss and the Rev. Canon Fowler; Librarian, Mr. Ferdinand Grut; and as other members of the Council, Prof. R. Meldola, F.R.S., Mr. Edward Saunders, Dr. D. Sharp, F.R.S., Mr. Richard South, Mr. Henry T. Stainton, F.R.S., Colonel Charles Swinhoe, Mr. George H. Verrall, and the Right Hon. Lord Walsingham, F.R.S. It was also announced that the new President had appointed Lord Walsingham, Prof. Meldola, and Dr. Sharp, Vice-Presidents for the session 1891–92.—Lord Walsingham, the retiring President, then delivered an address. After alluding to some of the more important entomological publications of the past year, and making special mention of those of Edwards and Scudder in America, of Romanhoff in Russia, of the Oberthürs in France, and of Godman and Salvin in England, the President referred to Mr. Moore's courageous undertaking in commencing his "Lepidoptera Indica," on the lines adopted in his "Lepidoptera of Ceylon." Attention was then called to the unusual development during the past year of the study of those problems which have been the object of the researches of Darwin, Wallace, Weismann, Meldola, Poulton, and others, and to the special and increasing literature of the subject. In this connection allusion was made to Mr. Tutt's "Entomologist's Record and Journal of Variation," to Mr. Poulton's valuable book "On the Meaning and Use of the Colours of Animals," and to the interesting and important papers and experiments of Mr. F. Merrifield on the subject of the variation in Lepidoptera caused by differences of temperature. After alluding to the International Zoological Congress held at Paris during the past year, and to the rules of nomenclature which had been once more reviewed and revised, the President concluded by referring to the losses by death during the year of several Fellows of the Society and other entomologists, special mention being made of Dr. J. S. Baly, M. l'Abbé de Marseul, Mr. Owen Wilson, M. Lucien Buquet, M. Eugène Desmarest, Prof. Heinrich Frey, Dr. R. C. R. Jordan, Mr. W. S. Dallas, Dr. L. W. Schaufuss, Dr. Hermann Dewitz, M. Louis Reiche, and Herr Peter Maassen.—A vote of thanks to the President and other officers of the Society having been passed, Lord Walsingham, Mr. Goss, and Mr. Grut replied, and the proceedings terminated.

PARIS.

Academy of Sciences, January 19.—M. Duchartre in the chair.—On the estimation of mineral matters contained in vegetable moulds and on their *rôle* in agriculture, by MM. Berthelot and G. André. The authors have previously described methods for accurately estimating phosphorus, sulphur, carbon, silica, aluminium, iron, soda, potassium, and other substances, in soils, vegetable moulds, and plants. They now devote special attention to the determination of alkalies and oxides, after eliminating silicates by treatment with hydrofluoric acid.—On the presence and *rôle* of sulphur in vegetables, by MM. Berthelot and G. André. The results of a series of experiments indicate, among other things, that the proportion of sulphur increases to the time of efflorescence, when it attains a maximum, and then decreases.—Experiments on the mechanical actions exercised on rocks by gases at high temperatures and pressures and in rapid motion, by M. Daubrée. The author has continued his researches on the effects produced upon rocks in contact with gases suddenly developed by means of such explosives as gun-cotton and dynamite. Temperatures of 2500°, and pressures of 1100 atmospheres, thus obtained, have been sufficient to fuse and pulverize the rocks experimented upon in a very marked manner. The results lead M. Daubrée to believe that the perforated pipes or *diatrèmes*, diamantiferous, volcanic, or otherwise, and much of the subaërial dust and oceanic deposits are formed by such actions as he has obtained in the laboratory. He also shows that rocks may acquire an apparent plasticity under the influence of pressure.—Contribution to the botanical history of the truffle; second note, *Terfas*, or the truffles of Africa and Arabia, of the genera *Terfezia* and *Tirmania*, by M. A. Chatin.—Description and employment of the Eucalyptus, by M. Ch. Naudin. About eighty species of Eucalyptus have been cultivated at Thuret. Of these fifty-six are described in a memoir presented by M. Naudin. The memoir will be of great service to applied botany.—Influence of dissolvents on the rotatory power of camphols and isocamphols, by M. A. Haller. Of eleven dissolvents used, only methyl alcohol exercised an influence on the rotatory power of left-handed α-camphol. The action exercised by different liquids on left-handed isocamphol appears to vary with their constitution, but is the same for each homologous series.—On the destruction of sugar in the blood *in vitro*, by MM. R. Lépine and Barral.—Memoir on the constitution of albuminoids, by Dr. H. Arnaud.—Observations of a star having a brightness comparable to that of Regulus, and situated in the same constellation, by M. E. Lescarbault. (See our Astronomical Column.)—*Résumé* of solar observations made at the Royal Observatory of the Roman College during the last six months of 1890, by M. P. Tacchini. (See our Astronomical Column.)—Observations of sun-spots made in 1890 with the Brunner equatorial (0·18 metre aperture) of Lyons Observatory, by M. E. Marchand.—A new gyratory apparatus, called the alternating gyroscope, by M. G. Sire.—On the telephonic reproduction of speech, by M. E. Mercadier.—Researches on a sulphur derivative of olein called *l'huile pour rouge*, by M. Scheurer-Kestner.—On the experimental production of exophthalmia, by M. H. Stilling.—On the variations of the pelvis of Cachalots, by MM. G. Pouchet and H. Beauregard.—On the character of the conchological fauna of the Sahara, by Dr. P. Fischer. M. J. Dybowski explored the environs of El Goleah last year, and made a collection of land and water mollusks in the sub-fossil state. These animals testify to the existence, in relatively recent times, of ponds and watercourses in a region which may be taken as a type of many others. The inhabitants of the neighbourhood have a tradition that at some past age El Goleah was in the middle of a fertile and well-watered region, and this opinion seems now to be confirmed.—On the development of larvas of Ascidiæ, by M. A. Pizon.—On two new zoospores, parasites of the muscles of fishes, by M. P. Thélohan.—On the presence of native nickel in the sands of the Elvo torrent, near Biella (Piémont), by M. Alfonso Sella. An examination of auriferous sand from the Elvo torrent showed to M. Sella small metallic grains consisting of native nickel associated with iron. The mineral is analogous to certain meteoric irons, such as the Ovifak, but appears to be of terrestrial origin.

DIARY OF SOCIETIES.

London.

THURSDAY, January 29.

Royal Society, at 4.30.—The Bakerian Lecture, "On Tidal Prediction: Prof. G. H. Darwin, F.R.S.

Institution of Mechanical Engineers, at 7.30.—Annual General Meeting.—On some Different Forms of Gas Furnaces: Bernard Dawson.—On the Mechanical Treatment of Moulding Sand: Walter Bagshaw.—Fourth Report of the Research Committee on Friction; Experiments on the Friction of a Pivot Bearing.

Royal Institution, at 3.—The Little Manx Nation: Hall Caine.

FRIDAY, January 30.

Institution of Mechanical Engineers, at 7.30.—Annual General Meeting.—On some Different Forms of Gas Furnaces: Bernard Dawson.—On the Mechanical Treatment of Moulding Sand: Walter Bagshaw.—Fourth Report of the Research Committee on Friction; Experiments on the Friction of a Pivot Bearing.

Institution of Civil Engineers, at 7.30.—The Counterbalancing of Locomotive Engines: Edmund L. Hill.

Royal Institution, at 9.—On the Rejuvenescence of Crystals: Prof. J. W. Judd, F.R.S.

SATURDAY, January 31.

Royal Institution, at 3.—Pre-Greek Schools of Art: Martin Conway.

SUNDAY, February 1.

Sunday Lecture Society, at 4.—The Life and Death of Worlds: Mrs. S. D. Proctor.

MONDAY, February 2.

Society of Arts, at 8.—The Construction and Capabilities of Musical Instruments: A. J. Hipkins.

Royal Institution, at 5.—General Monthly Meeting.

TUESDAY, February 3.

Zoological Society, at 8.30.—On the Question of Saurognathism of the Pici, and other Osteological Notes upon that Group: Dr. R. W. Shufeldt, C.M.Z.S.—On Two New Species of Parrots of the Genus Platycercus: Count T. Salvadori.—On a Collection of Birds from Tarapacà, Northern Chili: P. L. Sclater, F.R.S.

Institution of Civil Engineers, at 8.—Ballot for Members.—Electric Mining Machinery: Llewelyn B. and Claude W. Atkinson.——At 9.—Reception by the President and Council.

Royal Institution, at 3.—The Structure and Functions of the Nervous System; Part I. The Spinal Cord and Ganglia: Prof. Victor Horsley, F.R.S.

WEDNESDAY, February 4.

Geological Society, at 8.—The Geology of Barbados and the West Indies; Part I. the Coral Rocks: A. J. Jukes-Browne and Prof. J. B. Harrison.—On the Shap Granite: A. Harker and J. E. Marr.

Entomological Society, at 7.—The Life-history of the Hessian Fly: Frederick Enock.—On some Recent Additions to the List of South African Butterflies: Roland Trimen, F.R.S.—Additions to the Carabideous Fauna of Mexico, with Remarks on Species previously recorded: Henry W. Bates, F.R.S.—Notes on the Genus Xanthospilopteryx, Wallgr.: William F. Kirby.—On the Rhyncophorous Coleoptera of Japan: Dr. David Sharp, F.R.S.—On Mimetic Resemblances between Species of the Coleopterous Genera Lema and Diabrotica: Charles J. Gahan.

Society of Arts, at 8.—Decimal Coinage, Weights, and Measures: J. Emerson Dowson.

THURSDAY, February 5.

Royal Society, at 4.30.

Linnean Society, at 8.—On the Tree Ferns of Sikkim: J. Gammie, Jun.—Life-history of Two Species of Puccinia: A. Barclay.

Chemical Society, at 8.

Royal Institution, at 3.—The Little Manx Nation: Hall Caine.

FRIDAY, February 6.

Geologists' Association, at 7.30.—Annual Meeting.—Further Notes on the Geological Record: The President.

Royal Institution, at 9.—Some Applications of Photography: Right Hon. Lord Rayleigh.

SATURDAY, February 7.

Geological Field Class, at 4.15.—The Gravel Beds of the Thames and its Tributaries in Relation to Ancient and Modern Civilization: Prof. H. G. Seeley, F.R.S.

Royal Institution, at 3.—Pre-Greek Schools of Art: W. Martin Conway.

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